

REMARKSa. Claim 16

Claim 16 was amended so that the same depended from a that was present in the case. Claim 16 formerly depended from claim 15 that had been cancelled. It should be pointed out that claim 16 defines a borehole caliper tool in which a sliding pivot joint is formed between the second end and the bow spring. The sliding pivot joint is described in paragraph [0017] as being a pin-in-slot joint coupling the cam follower arm to the pad. It is submitted that this feature is wholly absent from the cited prior art. Therefore, considering that the pin-in-slot joint is wholly absent from the cited prior art, Applicants respectfully submit that there is no suggestion to provide the same. Therefore, Applicants respectfully contend that the invention defined by claim 16 is not obvious in view of the cited prior art.

b. Claim 1

In response to the Advisory action Office Applicants provide the following arguments in addition to those set forth in the response to the Final Office action. In the Advisory action, it was stated that the arguments were not persuasive because Applicants argued the reference separately and the relative position of the cam in Hunt-Grubbe is what was being modified by Groner et al., not the type of sensor, Applicants submit that it is the modification of Hunt-Grubbe with the teachings of Groner et al. that were being traversed.

In the Final Office action, Groner et al. are alleged to teach "placing the cam mass in such a position that the cam mass moves away from the proximity sensor when the follow arm moves away from the body." See Final Office Action page 3. Applicants contend that the cam disclosed therein as element 38 neither moves toward or away from the sensor, because Groner et al. make clear that the distance between the sensor and the cam 38 must remain fixed. As a result, the cam neither moves toward nor away from the sensor. This is premised upon the contention that Groner et al.'s push rod 40b, deflection plane 42 deflection transfer rod 50 and springs 44b and 48 are analogous to Applicants claimed sensor. As a result, it becomes clear that contact between push rod 40b and cam 38 must be maintained in order to obtain an accurate measurement of a bore diameter. Specifically, Groner et al. employ a mechanical sensor that includes deformation of a

plate 42 to record a borehole diameter vis-à-vis transfer rod 50. See lines 67 column, 3 to line 7, column 4. Key to obtaining a proper measurement of the borehole diameter is balancing of opposed spring forces. See *id.* The balancing of spring forces would not occur were cam 38 to become spaced apart from the sensor (push rod 40b). Therefore, it is submitted that the cam 38 in Groner et al. neither moves away from nor toward the sensor (push rod 40b). As a result, Groner et al. does not teach moving a cam away from a sensor as claimed by Applicants. Rather, the distance between the two is fixed so that changes in spring forces may occur. Without more, Applicants respectfully contend that claim 1 is not obvious in view of the prior art.

Moreover, assuming that Groner et al. teach the limitations set forth in the Final Office action Applicants contend that there would be no suggestion to modify Hunt-Grubbe to include the same. Hunt-Grubbe teaches moving the nose 40 close to the proximity sensor 70 as the rigid caliper arm 32 moves away from the tool body, which is opposite to Applicants' claimed invention. See Fig. 3 of Hunt-Grubbe and accompanying text. This results from the cantilever movement of the rigid caliper arm 32 and contact finger 38 and nose 40 being disposed at opposite ends thereof. See *id.* Moreover, there is no disclosure or suggestion to modify Hunt-Grubbe to include Applicants' claimed features, because Hunt-Grubbe teaches away from having springs coupled to arms for mounting purposes. See col. 4, lines 23-25. Based upon the foregoing, Applicants respectfully contend that claims 1 and 21 are not obvious in view of the cited prior art.

c. Claim 11

Claim 11 defines a borehole caliper tool having, in pertinent part, a pad for engagement with a surface of the borehole and a cam pivotally coupled to the pad, the cam having mass and being coupled to reciprocate about the pivot joint to facilitate a displacement of the mass with respect to a proximity sensor in response to contact of the pad with the surface. Hunt-Grubbe does not teach pivotally coupling the pad to the cam. Rather, Hunt-Grubbe teaches that is it desired to have the nose 40 in a fixed spatial relationship with respect to the rounded tip 38. See col. 3, lines 26-37; col. 4, lines 9-13. Specifically, the caliper arm is defined as being rigid and the nose portion is described as serving as a reference point to unambiguously define the position of rounded tip 38.

Thus, Hunt-Grubbe teaches away from the claimed caliper tool in which the pad is pivotally coupled to the cam, thereby allowing the relative positions between the two to vary.

Smith et al. do not overcome the deficiencies of Hunt-Grubbe. Assuming that Smith et al. teach having a pad for engagement with a surface of a borehole and a cam pivotally coupled thereto, the pad that Smith et al. describes must be coupled to two moment arms in order to maintain the pad's position against a borehold. (See col. 3, lines 37-42). Therefore, in order to modify Hunt-Grubbe to have Smith et al.'s pad, Hunt-Grubbe would require an additional lever in order to provide the rigidity advocate by Hunt-Grubbe employing the teachings of Smith et al. This is clear missing from Hunt-Grubbe. Therefore, there is no suggestion to modify Hunt-Grubbe to include the features of Smith et al. Moreover, none of the remaining cited references overcome the deficiencies of Hunt-Grubbe. Therefore, Applicants respectfully contend that the invention defined by claim 11 is not obvious in view of the cited art.

d. Amended Claim 21

Amended claim 21 defines a method for gauging a diameter of a borehole having a longitudinal axis extending transversely to the diameter, the method includes, in pertinent part, moving a tool body having a proximity sensor and an arm assembly along the longitudinal axis. The follower arm has a cam including mass. Displacement of the mass is monitored to determine the magnitude of the bore diameter based upon a magnitude of the displacement. The magnitude of the displacement is inversely related to the bore diameter.

As discussed above with respect to amended claim 1, the mass of the cam is displaced away from the proximity sensor in response to rotation of the follower arm outwardly away from the tool body. This results from the use of the bow spring having the pad proximately centered thereupon. As a result, as the bore diameter becomes smaller, the angle of the follower arm becomes greater resulting in greater displacement of the cam from the proximity sensor. Conversely, as the borehole diameter becomes larger, displacement of the mass from the proximity sensor becomes larger. Thus, the displacement of the mass from the proximity sensor is inversely related to the borehole


diameter. Applicants submit that the arguments set forth above with respect to claim 1 apply with equal weight here and as a result the cited prior art does not suggest moving a cam mass away from the sensor as the borehole diameter increases. As a result, there is no suggestion to provide a method of measuring a borehole diameter so that as the borehole diameter becomes larger, displacement of the mass from the proximity sensor becomes larger. Therefore, Applicants respectfully contend that claim 21 is not obvious in view of the cited art.

3. The Non-obviousness of the Dependent Claims

Considering that the dependent claims include all of the features of the independent claims from which they depend, these claims are patentable to the extent that the independent claims are patentable. Therefore, Applicants respectfully contend that the dependent claims are in condition for grant.

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I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to the Commissioner for Patents.

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